



# Dennis Conservation Land Trust

Fall 2022

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# President's Message

Joseph Masse, President, Board of Trustees



The earth is tilted at 23.45 degrees from perpendicular. The earth rotates around the sun, with the axis always pointed in the same direction but tilted. So, even when the Northern Hemisphere is closer to the sun, we are having winter because though we are closer, the Southern Hemisphere gets the more direct rays. It's all about the tilt. The tilt creates the change in seasons.

Change affects all of us and all the life around us. It's not a case of whether change is good or bad but rather the fact that change is continual. Change affects everyone, the prepared and the unprepared. Being prepared is usually a real good idea.

Julie Early, who has helped guide the Trust through substantial change in our mission, has retired as of September 30. There are so many things Julie helped to bring to fruition during her tenure as Executive Director, including the purchase and sale agreement on Tobey West; initiating an interpretive sign series; developing a summer intern program; diversifying funding with grants that helped us move forward - specifically with our education and water initiatives, and much more.

Of all the things Julie accomplished, I believe the creation of the Cultural Respect Easement with the Native Land Conservancy (NLC) and the hiring and training of her replacement, David Fryxell, will prove to be the most important and provide the most lasting benefits.

The Cultural Respect Easement builds on our initial work completed five years ago wherein we granted access to the NLC to our largest single land holding. Unlike that Agreement, which applied to a single piece of property, the Cultural Respect Easement welcomes the NLC to all DCLT land holdings. This Easement is historic and will prove beneficial not only to the DCLT and the NLC, but will serve as a model for the environmental community.

David Fryxell became the Executive Director of the DCLT effective October 1st. We're grateful that Julie had the wisdom to understand the Trust must expand our mission to include an educational component. She knew David could fill that role and expand the value the Trust contributes to the community.

So, change comes to the Trust. Change comes as we bring Dave's skills, a Ph.D. in Ecology and Evolutionary Biology, to bear. And, change comes as Dave takes over the helm as Executive Director.

Julie has been a partner, a leader, an innovator, a trainer, and so much more. Her calmness under fire, and her patience and persistence, will be missed. But Julie knows better than most that it's all about the tilt. Change is always coming. Feeling the winds of change and orchestrating to benefit from the change is the gift Julie has left us.

In closing, I would once again thank all of you for caring about what we do and helping us do it. You are part of the "green team" and this Trust would not be in business were it not for your support.



Colorful mushrooms at DCLT's Nickerson Trail property



# 21<sup>st</sup> Annual Summer Auction



Photos by Fleeting Moments Photography



# Nature's Connections

David Fryxell, Executive Director

Cape Cod calls to mind pine forests, kettle ponds, saltmarshes, and the ocean. Each is cherished, and in a sense, discrete. But to me, what makes the nature of Cape Cod so captivating is not the presence of these beloved ecosystems per se, but rather, the connections, often surprising, that exist among them.

This past summer I worked to survey temporary, isolated pools, and learn about the critters that call them home. These “vernal pools” dry seasonally, are isolated from other surface waters, and contain only those species able to tolerate dry conditions for part of life. Some, like tiny fingernail clams and plankton, stay in place throughout the year, using special adaptations to endure regular desiccation. Most, like wood frogs and peepers, dragonflies and damselflies, as well as ducks, raccoons, and mink, survive by leaving pools at will. In a sense then, all these creatures are “amphibians” of a kind, relying upon the health of land and water, as well as intact connections between them.

At one such unnamed pool around the Plashes Conservation Area, the haul of a seine net uncovered an awesome surprise. Squirming in the back of our net was a snake, or a worm, or a leech, wait, no, a fish!

The young American eel, no doubt a recent Bermudan emigrant, had found itself in this isolated pond, or ‘plash,’ just a stone’s throw from Lower County Road. While this discovery precluded certifying the plash as a vernal pool with the State, and the added land protections that come along with it, we found this eel in

its new Dennis home, surrounded by a unique community of vernal pool species. Not only was this plash connected to land through its amphibious inhabitants, but also to the sea through this diminutive eel!

How did it get here? I knew from my years living in New Zealand that eels can travel overland in the right, wet forest conditions. Adult eels will traverse land in search of better freshwater conditions for growth or during spawning runs to sea. But for a baby eel, overland travel is no small feat. I walked around the plash again and found no obvious hydrological connections. I scoured mapping resources, and still found nothing. The mystery remains.



A grey tree frog tadpole.

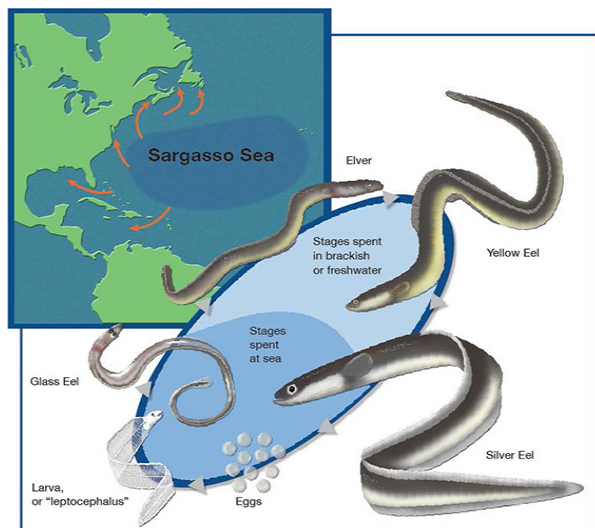
The arrival of European colonists to New England profoundly altered connections between freshwater and land, freshwater and sea, and land and sea alike. Dikes, dams, and ditches were built to harness hydropower, cultivate cranberries, capture fishes, construct roads, and protect infrastructure. Species that depend on ecosystem links, like frogs, salamanders, eels, and herring, have become imperiled, as have the unique roles that each plays in the ecosystem.





DCLT's Apple Tree Pool property

For example, river herring start their lives in a freshwater pond or river, and grow through summer before leaving for the ocean. There, if lucky, herring survive for several years before maturing and returning to the same or a nearby pond or river to spawn, carrying in them a chemical concoction derived from sustenance at sea.



The life cycle of American eel © Melissa Beveridge, www.naturalhistoryillustration.com

Historic herring runs would have been a major source of marine-derived nutrients for nutrient-poor inland ecosystems that characterized Cape Cod. This natural nutrient ‘subsidy’ from the ocean would have been a key contributor to the nature and health of our ponds and forests back then.

Today, herring are rare and contribute little nourishment to inland ecosystems. Instead, our inland and coastal ecosystems are nourished, if not over-nourished, when we flush water through our septic systems. This is the start of a story about ecosystem connections that, thanks to major

wastewater outreach efforts, has become among the best known locally.

When waste flows into our septic, a sludge settles out, trapping infectious agents that once plagued our waters. But water still leaches into the environment, laden with nutrients and other chemicals, traveling with groundwater into our ponds and coastal creeks. These excess nutrients cause excessive algae growth, toxic cyanobacterial blooms, and ultimately, may contribute to low oxygen ‘dead zones,’ like the one that’s forced the closure of the lobster fishery in recent years in Southern Cape Cod Bay.

No longer is raw sewage being pumped directly into the Bay; today’s waste problem has become more discreet, covered up by an underground network of complex hydrological connections – and we are just now starting to understand its far-reaching effects.

When we step into nature, into our backyard, onto a boat, or travel across town to our favorite conservation area, let’s keep connections in mind. Connections generate the biodiversity and aesthetics we come to love in any given ecosystem. They bring into focus the importance of protecting not just your favorite, but all the ecosystems, species, and processes to which it is connected.

Nature’s connections must be conserved, and we must come to understand how our activities are altering them. At the DCLT we protect land to protect land, but we also protect land to protect water; we protect water to protect land; and we do so to ensure our own health, our livelihoods, and that of the frogs, deer, eel, herring, osprey, and every other species that however fleetingly, call Dennis home.



# Connecting with DCLT's Community Scientist

Charlotte Gebhard, Summer 2022 Intern & David Fryxell, Executive Director

Sandy Road to the ARC Hatchery

This past summer, Dennis resident and environmentalist Gail Hart volunteered to work alongside DCLT staff to monitor the health of Chase Garden Creek. Every two weeks in the early morning, Gail visited the Creek as the tide retreated to collect water samples along the Creek. While she had never used an electronic water sampling meter before, and is new to the collection protocols, Gail has provided a wealth of perspective on the area surrounding Chase Garden Creek and Dennis as a whole.

For many years Gail worked at and then co-owned the Aquacultural Research Corporation (ARC) near the mouth of Chase Garden Creek by Chapin Beach. Gail started work there in 1976, and then she, with partners Dick Kraus and Sue Machie, purchased the business in 1994. Their experimental work helped to develop spawning and growing techniques that are now used throughout the aquaculture industry. Their production itself provided shellfish seed for growers and wholesale product throughout the US and Canada. As Gail noted in this interview, the ARC continues to support the entire aquaculture industry on Cape Cod, and many livelihoods too:

“These oysters and clams are going out to all the farmers who make their living on the flats, so without us, they would be left with one other choice, one other supplier. We’re on to third generation farmers now. These people have paid their mortgages off, sent their kids to college, their kids have come back to work on the flats, and now it’s repeating. The sphere of influence is huge.”

The ARC is an aquaculture facility specializing in the production of clams and oyster seed, as well as

producing their own market-sized crop. To do this they primarily use groundwater pumped from saltwater wells beneath the facility. Due to concerns about pollution, they make little use of water drawn directly from the Creek, but ultimately, both water sources are connected.



Gail Hart and Charlotte Gebhard sample the Creek at DCLT's Tobey Woodlands.

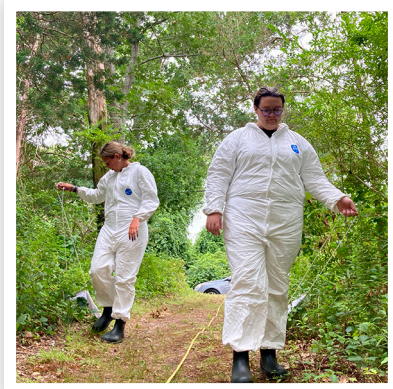
As pollution from septic systems, lawns, and roads is washed down the Creek and into the Bay, some is absorbed into the sediment, and can contaminate groundwater to the point where the sand can no longer filter it sufficiently. Monitoring the water quality at Chase Garden Creek is not a solution to these problems, but a way to detect concerning changes to the environment and inform decisions to address risks that threaten the creek, the land, and the ARC.

A new group of owners purchased the ARC in 2015 and Gail has since kept busy in her retirement. In addition to spending more time with her family, she still cherishes the ARC and Chase Garden Creek, so began volunteering with the DCLT.

“The DCLT has been a great resource for the town, and if there’s anything I believe in, it’s preserving open space. Monitoring is critical, but ultimately, land preservation is what protects the Creek.”



# Summer Highlights





# Connected Cape Cod Bay

Owen Nichols, Director of Marine Fisheries Research, CCS



CCS monitors a tidal creek with AmeriCorps Cape Cod

Working with the Cape's commercial fishing community, the Provincetown Center for Coastal Studies (CCS) often engages in conversations about the factors behind declines or recovery failures of fish populations. When overharvesting or other fishing-related causes are suggested, fishermen will sometimes point to other causes: natural variability, or human impacts not related to fishing. While this 'whataboutism' can be frustrating in some circumstances, it is often appropriate in the context of complex marine ecosystems, where a single cause of change can rarely be pinpointed, and causes are often linked to human activities far away, even on land.

Some of the more frequent 'what about' questions from the fishing community are, "what about nutrient pollution from septic and fertilizer?" and, "what about changing water temperature?" As we have investigated offshore processes, we often find ourselves looking inshore at the connections between oceanic fish populations and their estuary-nurseries, or at the linkages between offshore conditions and the nearshore and land-based environment, especially that of our bays, marshes, and coastal lagoons.

Cape Cod Bay is federally designated essential fish habitat and critical habitat for the North Atlantic right

whale, and is surrounded by diverse coastal habitats connecting the Bay to land. The CCS has studied the Bay and its beaches for over 40 years, surveying for whales, studying its plankton and shifting sands, and collecting and processing water samples, like our new collaborative work to process the samples collected by the DCLT at Chase Garden Creek.

While much of our work takes us far afield of the Bay, we continually find ourselves focusing on our own backyards. For example, when CCS began a study to monitor the effects of the Boston Harbor sewage outfall in the early 2000s, we found that localized nutrient pollution was a more significant source of concern than the diluted effluent from the outfall. Similarly, during a recent workshop on ocean acidification, participants expressed greatest concern about its effects when considered in combination with land-based nutrient pollution and associated declines in the oxygen available for fishes.

When a low oxygen "dead zone" was discovered in southern Cape Cod Bay, requiring closures of the lobster fishery from Sandwich to Dennis, we launched a study investigating its underlying causes. No simple story emerged but our



analysis points to a series of causes that appear to occur in tandem: changing wind fields, the bloom of an introduced algal species, and warming water temperatures.

Cape Cod Bay is at the southwestern extent of the Gulf of Maine, a deep basin that extends north to Nova Scotia, connected to the North Atlantic via deep channels in between the mainland and the shallows of Georges and Brown's Banks. Climate-driven shifts in water circulation are increasing the volume of warm water that enters the Gulf, causing its waters to warm even faster than the global ocean. As we try to predict the effects of climate change and attempt to adapt, we increasingly recognize the value of preserving and restoring key coastal habitats, like Barnstable's Great Marsh and the Black Flats on Chase Garden Creek, which are vital buffers for rising sea levels and sinks for pollutants and atmospheric carbon.

We realize more than ever the need for long-term monitoring; we need metrics to measure the success of habitat restoration and land conservation, in order to set baselines and measure changes. Change is the only constant in nature, but we need to be able separate the signal from the noise, for example, in the case of parsing human-induced climate change from natural variability.

English fantasy novelist Sir Terry Pratchett once said, "If you do not know where you come from, then you don't know where you are, and if you don't know where you are, then you don't know where you're going. And if you don't know where you're going, you're probably going wrong." I can't think of many better ways to summarize the value of long-term monitoring of our precious coastal habitats, which must go hand-in-hand with our efforts to conserve and protect them.



The author, Owen Nichols

Cape Cod is blessed with a beautiful and complex Bay, influencing and influenced by our activities and livelihoods on land. We know that our land use practices, miles away, influence its health and productivity, as we know that our activities on the water can influence the health of our lands. Despite the substantial human footprint on our coast, we are fortunate that the Bay is surrounded by communities that value land conservation and habitat restoration: the Cape's nonprofits, like the DCLT and CCS, as well as municipalities and state and Federal agencies, who each have different specialties. We will continue working together synergistically to study, protect, restore, and monitor all the ecosystems that make our 'One Cape' home.



Photo by Eric Carlson





# From COVID College to the DCLT

Charlotte Gebhard, Summer 2022 Intern



Sampling the upper Creek by Howes Pasture. Photo by Julie Early

When COVID first hit in March of 2020 during my senior year of high school, my peers and I were left feeling directionless. I remember sitting in my kitchen with my mom as we got the news that we'd get a two-week extended vacation, which quickly turned into a month, and then turned into the rest of the year being virtual. The stress and sadness and uncertainty of that time as a student was constant. Not to mention that the pandemic overlapped with the release of college decisions, pushing students to make decisions about our futures when we had no possible way of knowing what the world would look like the next week, let alone in the fall, or four years ahead.

During those first few months of anxiety about our lives and our futures, a more immediate question surfaced: What am I going to do this summer? Before the pandemic, I had planned to return to my job as a sleepaway camp counselor in the Berkshires. However, COVID canceled camp that summer, and since I lived with a high-risk individual, I couldn't pursue the typical summer jobs in retail and hospitality. As a compromise between making money and minimizing my exposure to the public, I took a job gardening for a local family.

It was perfect, all things considered. I got to be outside and by myself for a few hours a day, something that I desperately needed after months of quarantining with my parents and little brother. And I was busy! Before long I was gardening for 15-20 hours a week, pulling weeds, mowing lawns, and deadheading flowers. I loved it. I figured this would be my first and last COVID summer and was excited to go to college and then continue with normal life.

But it wasn't normal yet. After my first, strange COVID year of college and entering the summer of 2021, I went back to my job as a gardener. Once again, I was feeling a little bit lost. But through that time in the summer gardens, I began to realize it did more than keep me safe from COVID and help me pay my bills – it showed me how much I love the natural world. I realized that I didn't want to strive for a typical desk job; I wanted to be outside doing things to help the environment.

It was recommended to me that I explore a career in an environmental non-profit organization, which is how I came upon the opportunity at Dennis Conservation Land Trust. During this internship I have been able to see first-hand the wide range of work that goes into



running such an organization, and how fun and dynamic it can be. I guess COVID didn't disrupt my plans at all, but led me exactly where I needed to be.

The DCLT is small enough that it's possible to have a wide array of experiences as an intern. As I started, multiple projects were underway spanning land conservation, auction preparation, and ecological monitoring. Julie Early took the time to share all aspects of the organization, and I became excited about them all!

It was as if my goal to experience as much of the organization as I could was Julie's as well. She told me that DCLT needed a new brochure about the organization as well as one to spread the word about their new Water Initiative. Despite a lack of design experience, I had some ideas and got to work, using Canva, to create the brochures. It was not at all what I expected to be doing with DCLT, but it was a great way to see how I could apply various skills to conservation work.

I was also able to join Dave Fryxell and Gail Hart in Chase Garden Creek to help collect data for DCLT's new Water Initiative - a far cry from designing brochures! Every two weeks I would drive down from Boston, pull on a pair of waders, and trek out into the marsh to take field notes and record data. The mornings were long but fun in the open air. Gail and Dave recounted their various life adventures and experiences in Dennis and with environmental work to me as we hopped over marsh creeks and ducked under tree branches. I took notes on the differences in creek

height and made adjustments on the operating procedure (basically the "instruction manual" for water data collection) that I had drafted.

I also got some data interpretation exposure with a little help from Dave. I had no coding experience before working with DCLT, and Dave and Julie thought that it could be a good idea to teach me a little about it. 'R' is a coding application that can be used to create data graphs and illustrate relationships between various data points. Dave and I worked over Zoom in R with the data that we had collected from Chase Garden Creek. Coding was difficult and arduous, but Dave was extremely patient, and by the end of the summer, I could safely say that I could somewhat navigate the application on my own.

My summer was full of so many new and different experiences. Grant and report reading and writing, brochure design, data collection, coding - the list goes on! Not all internships give college students such a diverse array of tasks and I feel extremely fortunate to have worked with DCLT. Internships, at the end of the day, are about learning something new. Despite the pressure to decide on a major or career path in college, people my age rarely - if ever - know exactly what they want to do with their lives, and COVID made that especially difficult! Regardless of whether I continue to do nonprofit work in the future, I know that my time with DCLT gave me so many new experiences and skills to draw on as I continue to explore my interests. Who knows what next summer will bring?



The team samples the middle Creek by New Boston Road



# 2022 Annual Meeting



Photos by Fleeting Moments Photography



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